Aiming Circle Operations

Presented by

2d Battalion(FA)

395th Regiment

References

FM 6-50, 23 December 1996

TM 9-1290-262-10, April 1981

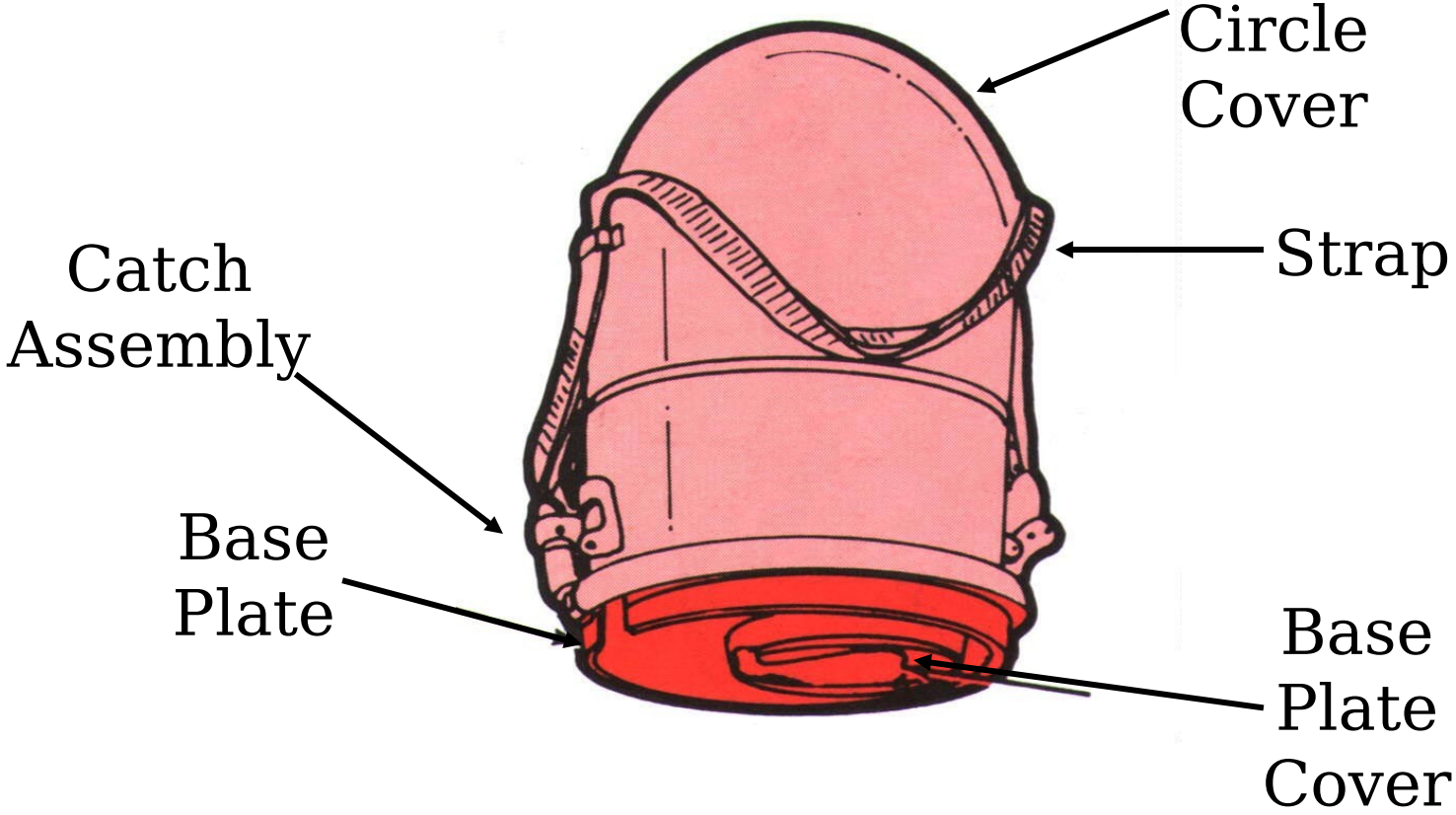
AGENDA

* Description of the M2A2 Aiming Circle
* Description of the tripod
* Setting up and leveling the aiming circle
* Taking down the aiming circle
* Declinating the aiming circle
* Laying by orienting angle
* Laying by grid azimuth

Description of M2A2 Aiming Circle

The M2A2 aiming circle is the primary means of orienting the cannon battery or laying weapons on the azimuth of fire. This section presents information that should be the starting point for any training program on the aiming circle. The aiming circle components are discussed on the next few slides.

Aiming Circle with Cover Installed

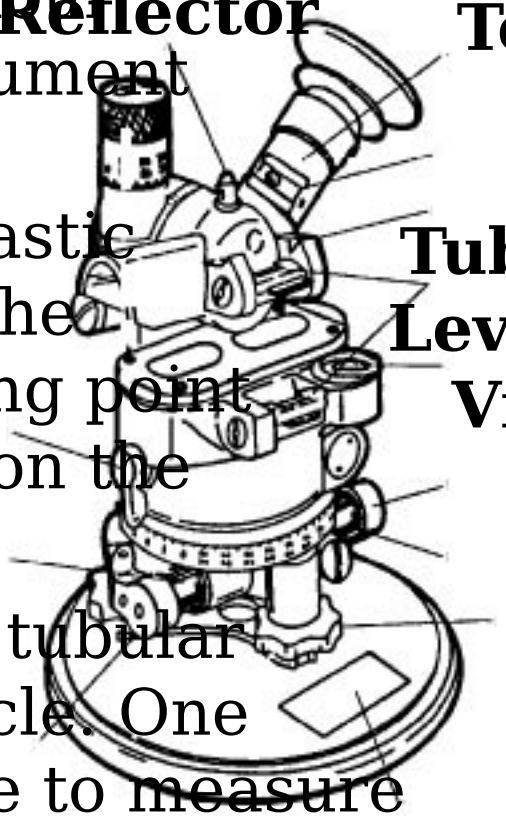


Components

Telescope. The telescope is a four power, fixed focus optical instrument with a reticle pattern.

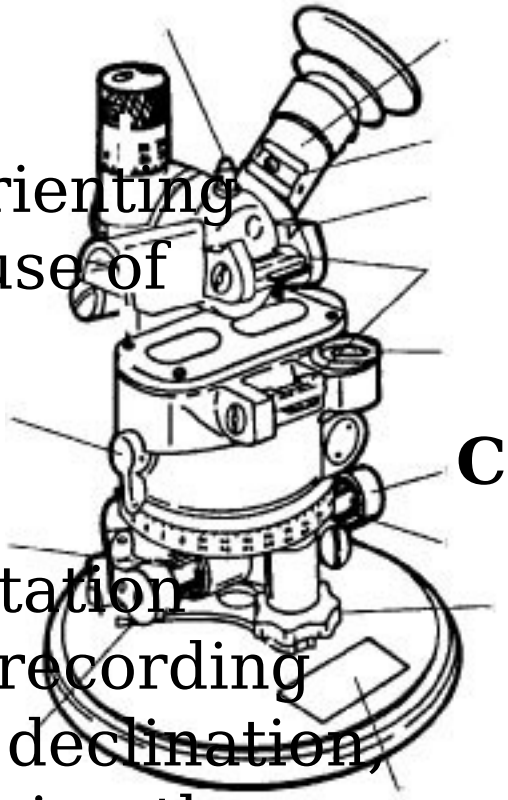
Reflector. The reflector is a plastic signal post mounted on top of the telescope. It is used as an aiming point for other instruments sighting on the aiming circle.

Leveling Vials. There are two tubular leveling vials on the aiming circle. One is used in leveling the telescope to measure vertical angles. The other is used to level the aiming circle.



Components

Covers. These caps cover the orienting knobs to prevent unintentional use of the lower motion.



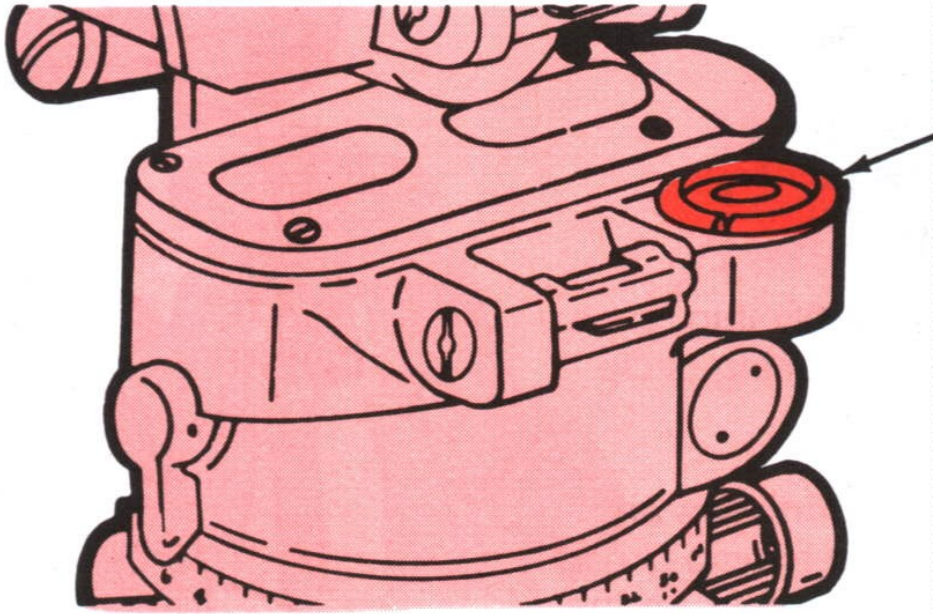
Covers

Notation Pad. A rectangular notation pad on the baseplate is used for recording the declination constant, date of declination, and initials of the person performing the declination.

Notation Pad

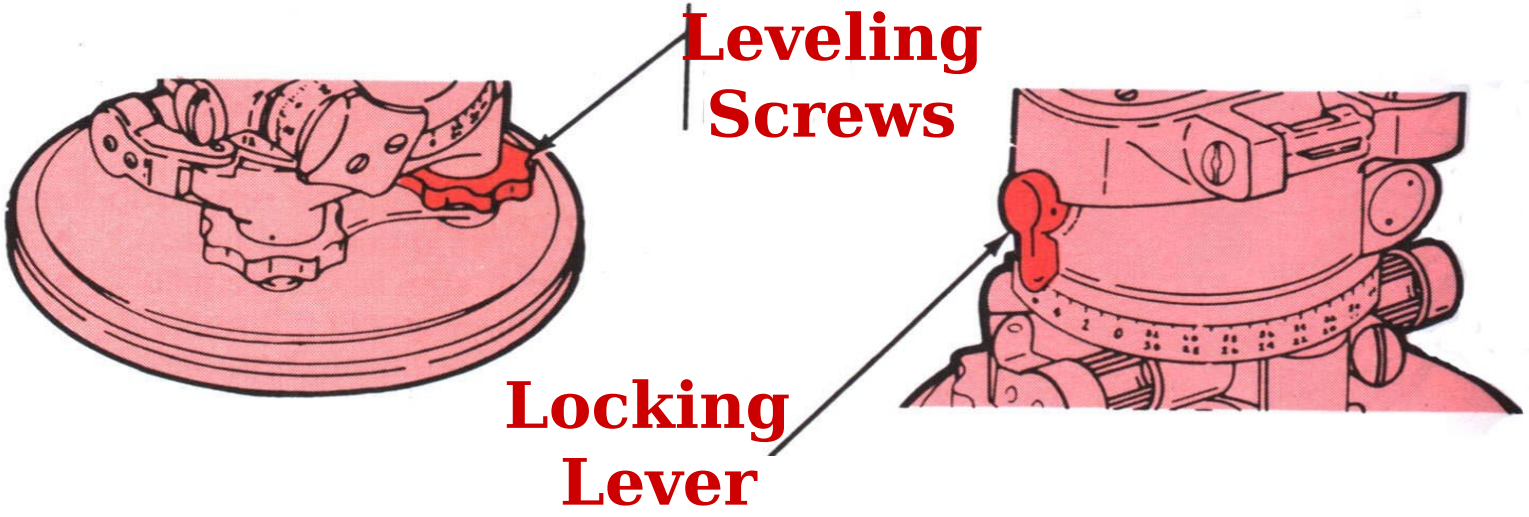
Components

Circular Level. Also known as the “fisheye bubble” is used to level the circle for measuring horizontal angles.



Components

Leveling Screws. The three leveling screws are used to level the aiming circle. These screws are on a spring plate located below the orienting knobs and

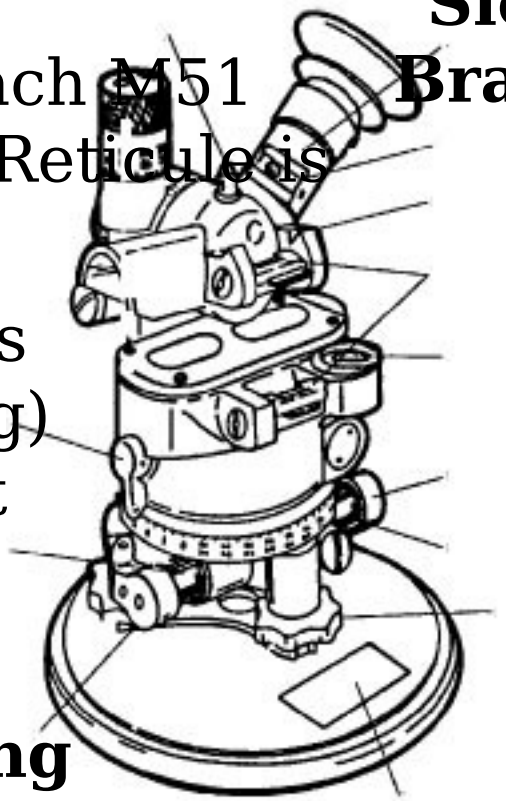


Locking Lever. When the locking lever is in a vertical position, the compass needle is locked. When the lever is turned either right or left to the horizontal position, the needle is unlocked.

Components

Slotted Bracket. Used to attach M51 instrument light bracket light. Reticule is lighted through the hole.

Orienting Knobs. These knobs control the lower (nonrecording) motion. They are used to orient the 0-3200 line of the aiming circle without changing the values on the upper motion.

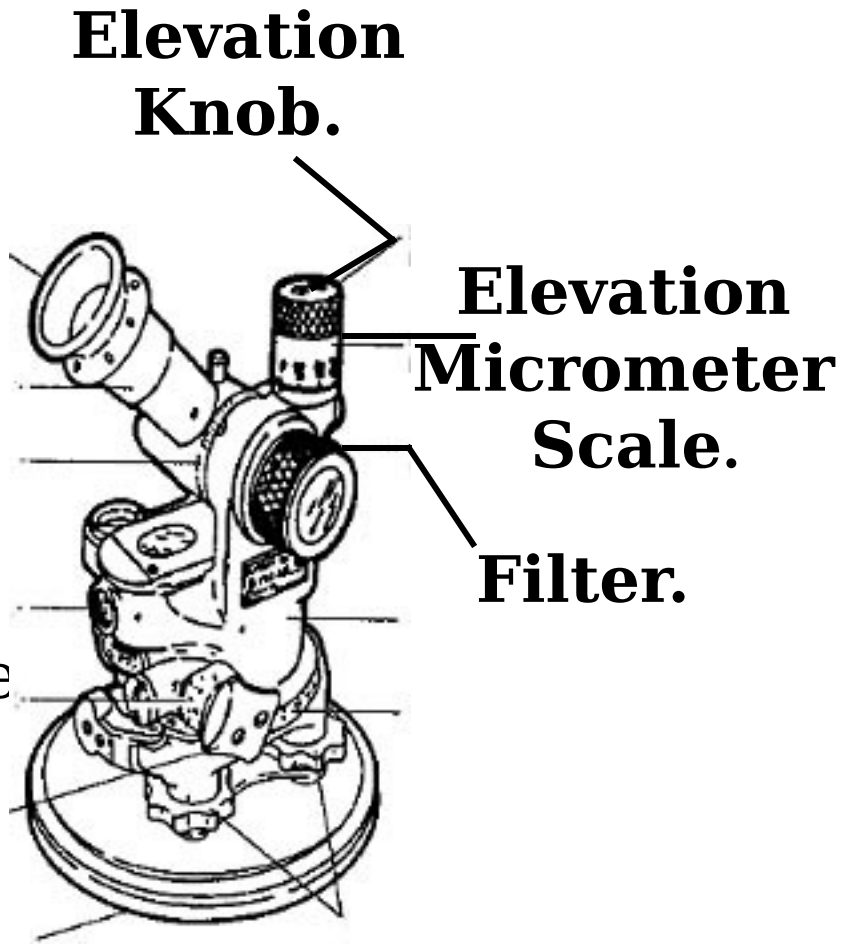


Components

Elevation Knob. Adjusts elbow telescope elevation.

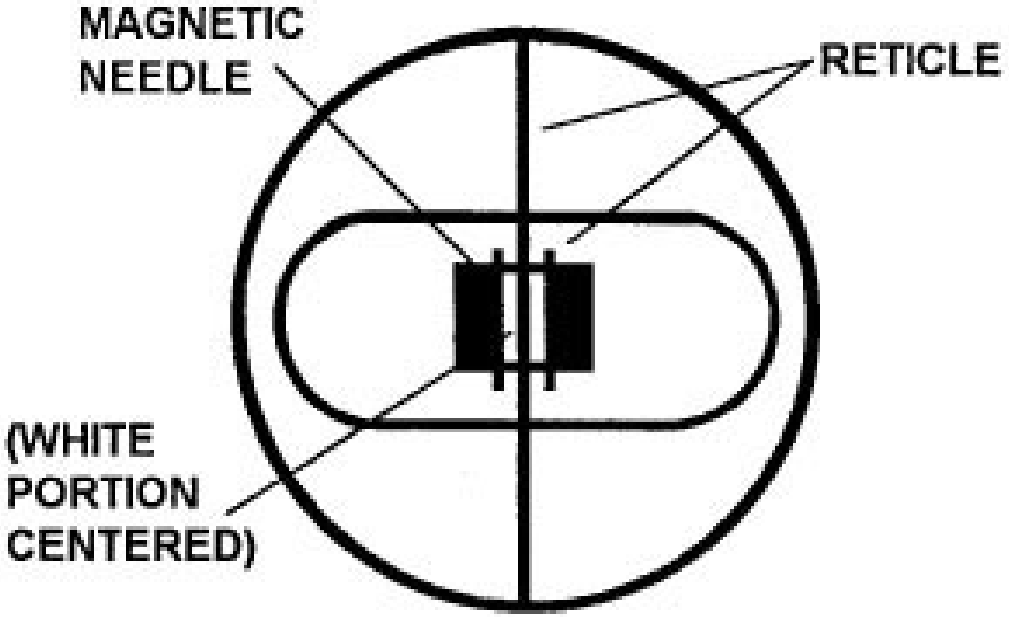
Elevation Micrometer Scale. Each graduation on the elevation micrometer scale represents 1 mil. The scale is numbered at 10-mil intervals.

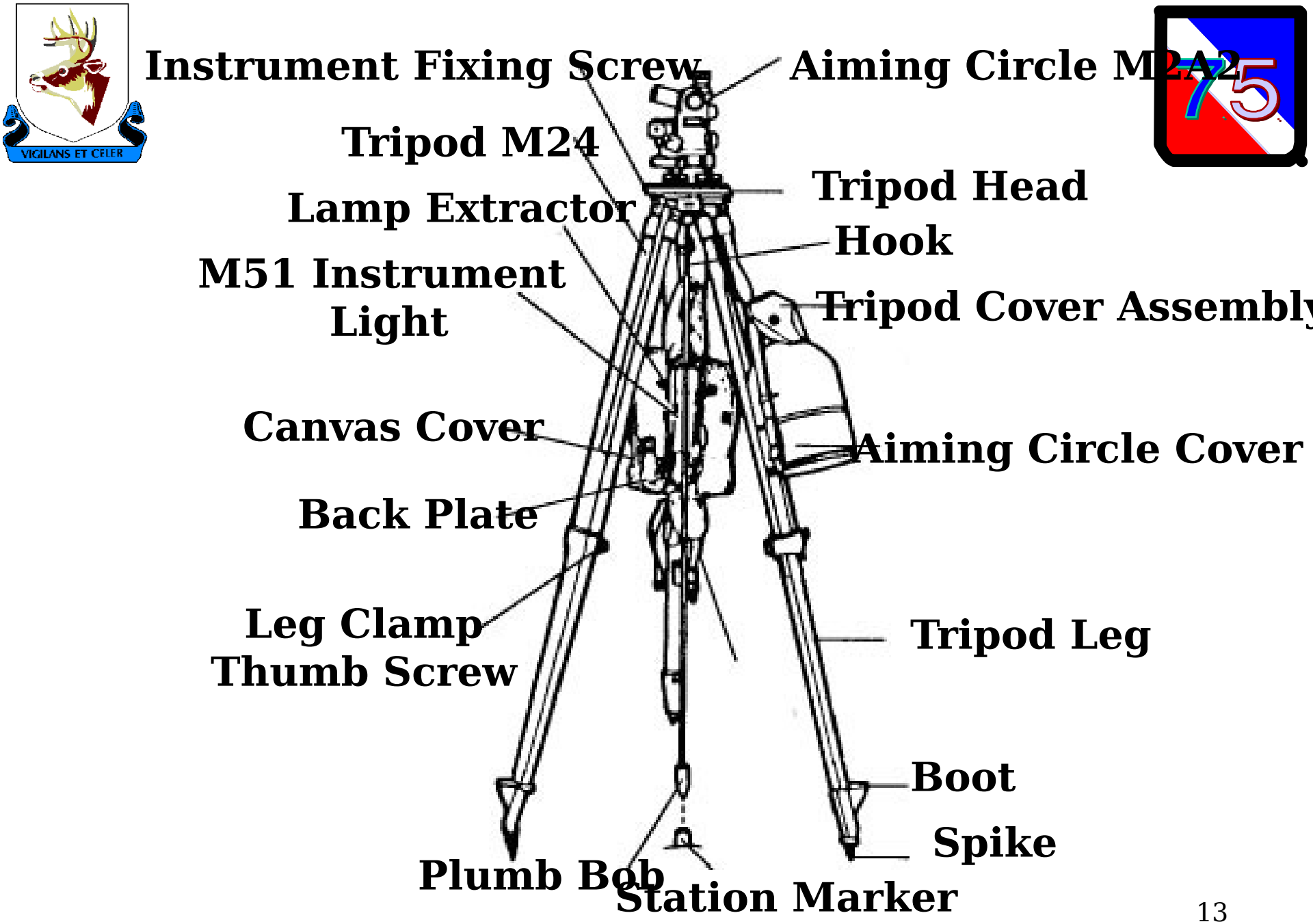
Filter. Used to protect your e
from sun rays.



Components

Magnetic Compass. The magnetic compass is located in the main housing. for rough centering, the magnetic needle may be seen through the windows on top of the body assembly. A small glass magnifier and reticle with three vertical lines are at on




Instrument Fixing Screw
Aiming Circle M2A2
Tripod M24
Tripod Head
Lamp Extractor
Hook
M51 Instrument Light
Tripod Cover Assembly
Canvas Cover
Aiming Circle Cover
Back Plate
Leg Clamp Thumb Screw
Tripod Leg
Boot
Spike
Plumb Bob
Station Marker

SETTING UP THE AIMING CIRCLE

To setup the aiming circle do the following act

(1) Unstrap the legs of the tripod, loosen the leg thumbscrews, and extend the legs to the desire Tighten the leg clamp thumbscrews.

(2) Place the tripod over the point to be occupie tripod leg should be pointing in the approximate direction of sighting, and the leg with the night- mount should be on the operator's left. Attach t plumb bob to the hook under the instrument-fix screw assembly. The plumb bob should be withi 1-inch radius of the station marker.

SETTING UP THE AIMING CIRCLE

(3) Firmly embed the tripod legs. Make sure the
head is approximately level when the legs are e
Then remove the tripod head cover.
(4) Pull back the spring-loaded cover on the bas
baseplate and place the aiming circle on the trip
Loosely screw the instrument-fixing screw asser
into the base plate.
(5) Center the plumb bob over the orienting sta
moving the base plate of the aiming circle.

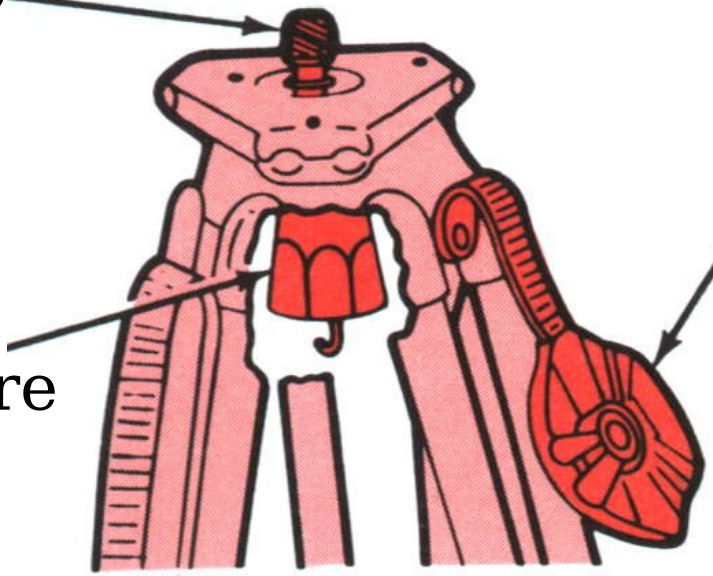
SETTING UP THE AIMING CIRCLE

(6) Tighten the instrument-fixing screw into the baseplate of the aiming circle.

(7) Remove the aiming circle head cover, and ha on the tripod head cover or a leg clamp thumbs prevent damage.

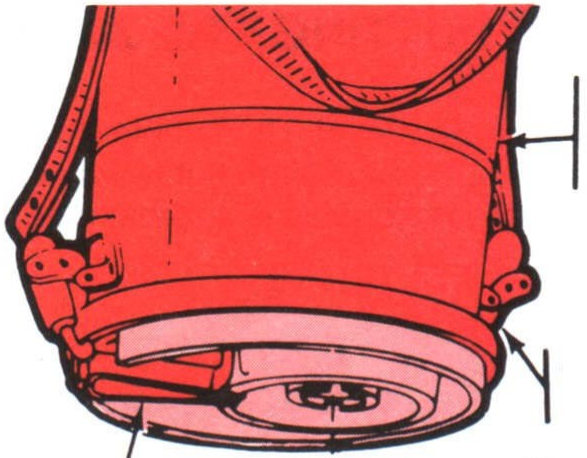
(8) Install the night lighting device if necessary.

Threaded end of screw assembly.



Tripod Cover Assembly

Turn screw assembly here

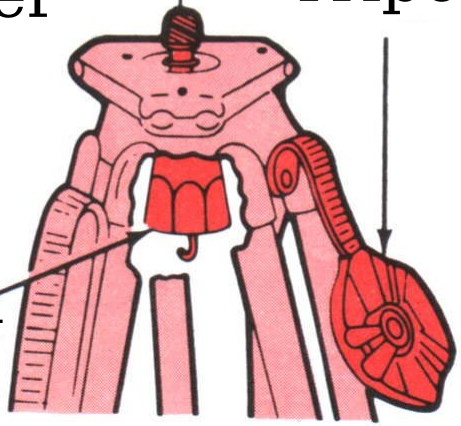


Aiming Circle Cover

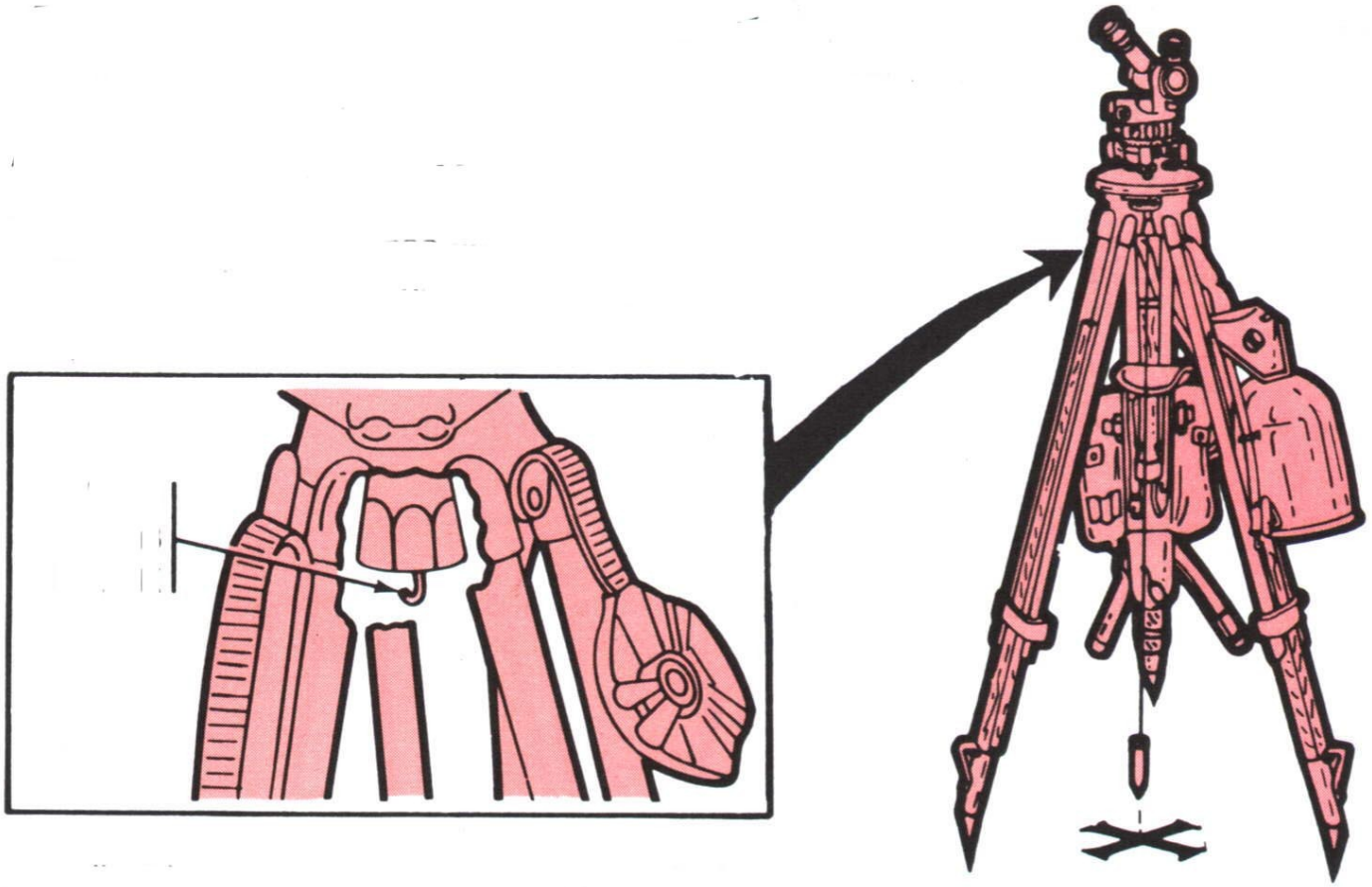
Catch Assembly

Base Plate Cover

Tripod Cover Assembly



Screw Assembly



Orienting Station

COMMON ERRORS IN SETTING UP THE AIMING CIRCLE

- Failure to tighten the instrument-fixing screw
- Not clearing the area of magnetic attractions
- Failure to use a plumb bob and properly level the aiming circle
- Failure to set up the tripod so that one leg is oriented in the direction of sighting

LEVELING THE AIMING CIRCLE

The preferred method of leveling the aiming circ
by using the circular leveling vial (fisheye bubbl
follows:

(1) Loosen the leveling screws approximately ha

(2) Rotate the head of the aiming circle until the
leveling vial is over the leveling screw adjacent
notation pad.

(3) Using the thumb and forefinger of each hand
the other two leveling screws in opposite direct
bubble will move in the same direction as the le

LEVELING THE AIMING CIRCLE

(4) When the bubble moves on line with the fish
center the bubble by using only the third levelin
Rotate the head over each of the other two scre
more than half the bubble moves out of the cent
relevel the instrument. If the bubble cannot be c
level the aiming circle by using the tubular level
and turn the instrument in for repair as soon as

TAKING DOWN THE AIMING CIRCLE

Take down the aiming circle as follows:

(a) Elevate the telescope to about 300 mils.

(b) Ensure the magnetic needle is locked.

(c) Cover the tubular leveling vials. Be sure the instrument light is turned off and secured in it's

(d) Ensure the caps of the orienting knobs are cl

(e) Place the azimuth knob over the notation pad

(f) Turn the leveling screws counterclockwise un screws are to their lower stops. Then loosen each screw knob one-quarter turn.

TAKING DOWN THE AIMING CIRCLE

Take down the aiming circle as follows:

(g) Place the carrying case cover over the aimin
and latch the cover locks.
(h) Unscrew the instrument-fixing screw, and re
instrument from the tripod.
(i) Replace the tripod head cover.

(j) Retract and collapse the tripod legs, and tigh
thumbscrews.

(k) Strap the tripod legs together.

DECLINATING THE AIMING CIRCLE

The aiming circle must be declinated when any of the following situations exist:

(a) After an electrical storm.

(b) Anytime the instrument has received a sever for example, if it is dropped from the bed of a tr the ground. The magnetic needle is a delicately mechanism, and any shock may cause a signific change in the declination constant.

(c) Anytime the aiming circle is moved outside a radius from the area in which it was last declin

DECLINATING THE AIMING CIRCLE

The aiming circle must be declinated when any of the following situations exist:

(d) A minimum of once every 30 days to determ any changes in the declination have occurred b of the annual shift of magnetic north or becaus accidents involving the instrument that may no been reported. If a radical change is observed, instrument should be declinated again within a to determine if the observed change is a real ch the characteristics of the instrument.

(e) When the instrument is first received

DECLINATING THE AIMING CIRCLE

The aiming circle must be declinated when any of the following situations exist:

(f) Anytime the instrument is returned from ord repair.

DECLINATING THE AIMING CIRCLE

The aiming circle must be declinated in an area free from magnetic attractions. Azimuths must be known to two or more azimuth marks, preferably in opposite directions. These azimuth marks should be a minimum distance of 300 meters, preferably 1,000 meters.

DECLINATING THE AIMING CIRCLE

Declinate the aiming circle as follows

(a) Set up the aiming circle, and level it.

(b) With the upper (recording) motion, set the k azimuth to the azimuth marker.

(c) With the lower (nonrecording) motion, sight azimuth marker that corresponds to the azimutl the upper motion.

(d) Release the magnetic needle. With the uppe float and center the magnetic needle.

(e) Read the declination constant directly from azimuth scale (to the nearest 0.5 mil).

DECLINATING THE AIMING CIRCLE

Declinate the aiming circle as follows

(f) Using a second azimuth, repeat the precedin
(If a second azimuth marker is not available,
first marker again).

(g) Compare the two declination constants dete
If they agree within 2 mils, determine the mean
it to the nearest whole mil by using artillery exp
On the notation pad, record the mean (four-digi
the date, and the initials of the individual perfo
declination.

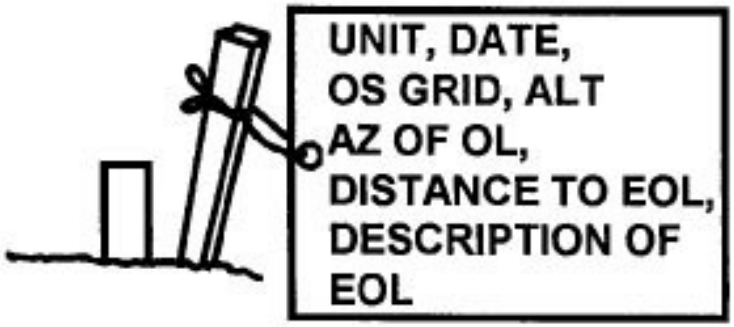
LAYING BY ORIENTING ANGLE

When survey is available, the following, as a minimum
will be provided.

(a) The orienting station (OS), with grid and alti
the station.

(b) The azimuth of the orienting line (OL).

(c) The description of the end of the orienting li



CHECK SURVEY

(a) Confirm the location on the OS tag by GPS, map spot, or the most accurate means available.

(b) One the upper motion, set off the declination constant.

(c) On the lower motion, float and center the needle

(d) On the upper motion, sight on the EOL. The instrument reading should be the azimuth to the EOL +/- 10 mils.

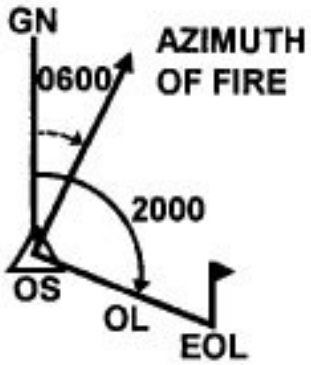
LAYING BY ORIENTING ANGLE

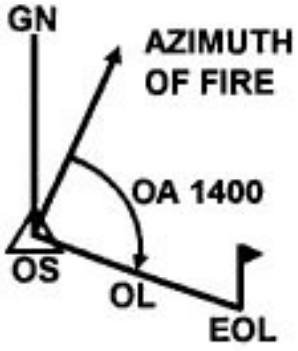
Steps in orienting angle (OA) method are as follows:

(1) Using the plumb bob, position the aiming circle over the orienting station.

(2) Compute the orienting angle by subtracting the azimuth of fire from the azimuth of the orienting line (add 6400 if necessary).

AZIMUTH OF OL	2000
AZIMUTH OF FIRE	-0600
ORIENTING ANGLE	1400





LAYING BY ORIENTING ANGLE

Steps in orienting angle (OA) method are as follows:

(3) With the upper motion, set the orienting angle.

(4) Using the lower motion, sight on the EOL. The 0-3200 line is now parallel to the azimuth of fire.

(5) Using the upper motion, sight on the howitzer pantel.

(6) Read the deflection on the azimuth and azimuth micrometer scales and announce it to the gunner on the howitzer. “NUMBER ONE, DEFLECTION 2582”

LAYING BY ORIENTING ANGLE

Steps in orienting angle (OA) method are as follows:

(7) The gunner sets the announced deflection on the pantel. He orders the howitzer to be shifted, and/or traverses the tube, until the line of sight through the pantel is again on the reflector of the aiming circle.

(8) The instrument operator again sights on the lens of the pantel and reads and announces the deflection. “NUMBER 1, DEFLECTION 2585”

The gunner reports “READY FOR RECHECK”

LAYING BY ORIENTING ANGLE

Steps in orienting angle (OA) method are as follows:

(9) This procedure is repeated until the gunner reports a difference of 0 mils between successive deflections.

LAYING BY ORIENTING ANGLE

Steps in orienting angle (OA) method are as follows:

(9) This procedure is repeated until the gunner reports a difference of 0 mils between successive deflections.

The piece has been laid

LAYING BY GRID AZIMUTH

Steps in grid azimuth method are as follows:

(a) If surveyed data are not available and **hasty survey** **is not possible**, the next best method of orienting the aiming circle is to use the magnetic needle.

(b) To orient the aiming circle on a grid azimuth by using the magnetic needle, complete the following steps.

(1) Determine the instrument reading (IR) to be placed on the instrument by subtracting the azimuth of fire from the declination constant (DC) of the aiming circle.

LAYING BY GRID AZIMUTH

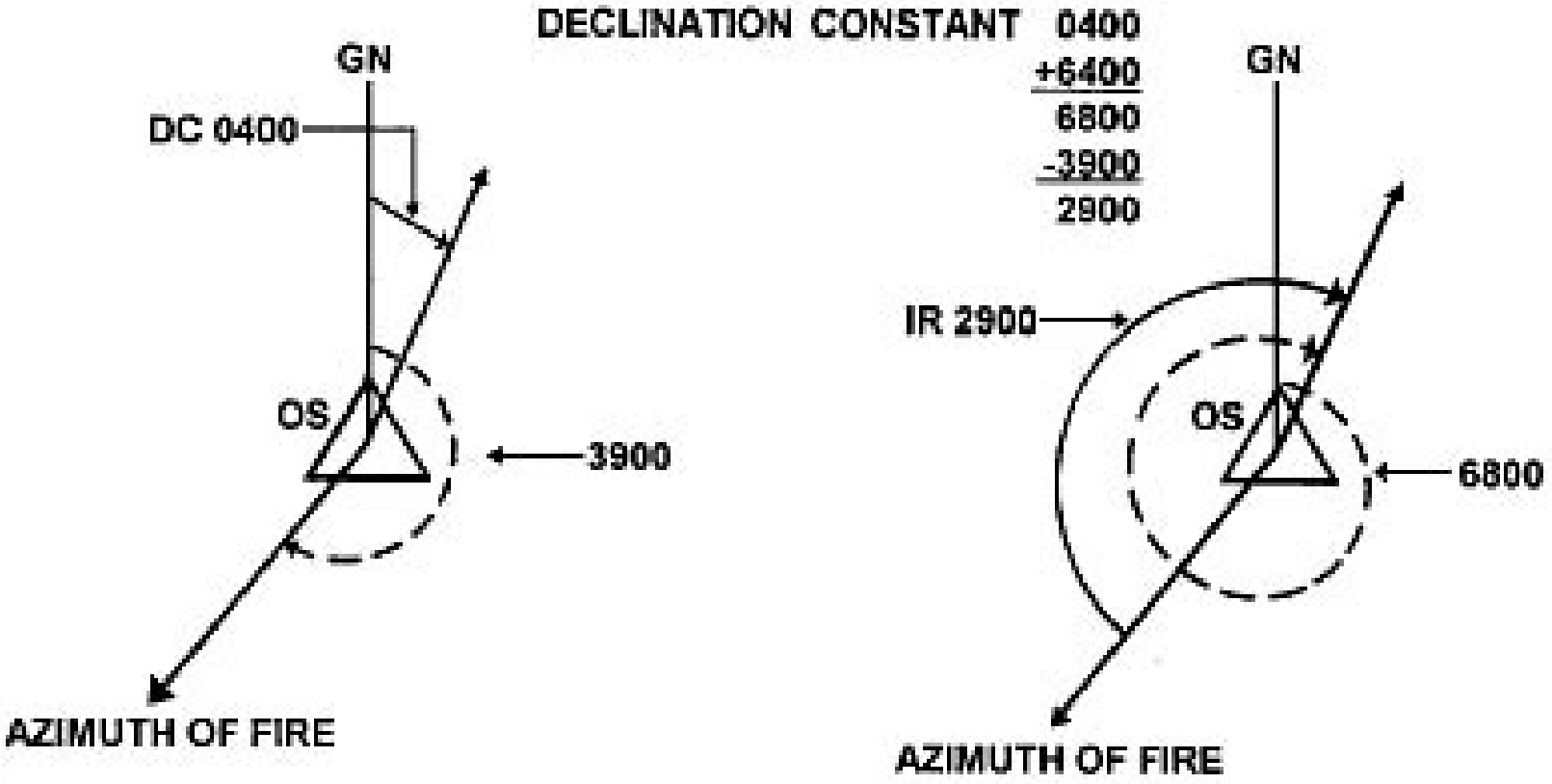
Steps in grid azimuth method are as follows:

(2) Place this value on the **upper** motion.

(3) Using the **lower** motion, center the magnetic needle.

(c) The next step is to lay the platoon reciprocally by using the **upper** motion and sighting on the howitzer pantel.

EXAMPLE


DECLINATION CONSTANT 0400
+6400
6800
-3900
2900
GN
DC 0400
OS
3900
AZIMUTH OF FIRE
GN
IR 2900
OS
6800
AZIMUTH OF FIRE

QUESTIONS?